

NOREAL  
COMPACTION  
Phase I  
North Bldg 37  
Area

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# **NorCal Engineering**

Soils and Geotechnical Consultants  
10641 Humbolt Street Los Alamitos, CA 90720  
(562) 799-9469 Fax (562) 799-9459

December 11, 1997

Project Number 5936-96

Boeing Realty Company  
4060 Lakewood Boulevard  
Lakewood, California 90808

Attn: Mr. Johnny Marasco

**RE: Observation and Testing of Backfill Operations from  
Demolition Procedures for Phase I - Located at the Southwest  
Corner of 190th Street and Normandie Avenue, in the City of Los  
Angeles, California**

Dear Mr. Marasco:

Pursuant to your request, this firm has observed and tested backfill operations from demolition procedures at the above referenced project. The results of compaction tests are attached and locations of these tests are shown on the accompanying plans. All work was performed in accordance with all present day standards of the Geotechnical Engineering Industry.

## **Backfill Operations**

Several areas including environmental piping trenches were demolished of existing structures and lines and then backfilled with compacted fill soils. Some subsurface structures consisting of concrete slabs and caissons were left in place in some areas. Any structure left in place was demolished to a minimum of 4 feet below ground surface. Items left in place are shown on the attached plans by Tait & Associates along with the elevation at which the structure lies. Other items of note are:

- The large northerly Excavation A was backfilled to -1 foot of existing grades.
- Pits 2, 4 and Building 36 excavation were also filled to within 1 foot of existing grades.
- Excavation 13 was tested only at 3.0-3.5 feet below existing surrounding grades.
- Maximum depth of fill placed in environmental trenches was 3 feet.
- Abandonment in-place of caissons and slabs was performed with the approval of City of Los Angeles Grading Department officials.

The maximum depth of fill placed during backfill operations was approximately 12 feet. Fill soils were compacted to a minimum of 90% of the laboratory standard in lifts not in excess of eight inches in thickness. Rubber tire and track-mounted grading equipment was used for compaction control; a water truck provided moisture control. The approximate limits of compacted fill are shown on the attached plans.

#### **Laboratory/Field Testing**

The relative compaction was determined by Sand Cone Method (ASTM: D1556-82) and by the Drive Tube Method (ASTM: D2937). The maximum density of the fill soils was obtained by the laboratory standard (ASTM: D1557-82) and results are shown on Table I. Tests were performed a minimum of every 500 cubic yards placed and every two feet in depth of fill placed. Results of field density tests are presented in Table II. No chemical analysis was performed by NorCal Engineering on the tank excavation nor the backfill soils.

**Conclusions**

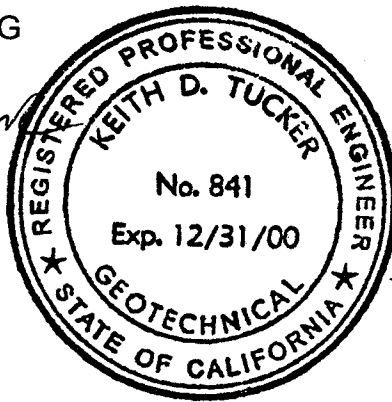
The geotechnical engineering aspects of the backfill operations have been observed and are in compliance with the geotechnical engineer's recommendations. Additional subsurface investigation and laboratory testing will be necessary in fill areas which will support new structures. The backfill meets secondary fill requirements for support of pavement and floor slab.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,  
NORCAL ENGINEERING

*Keith D. Tucker*

Keith D. Tucker  
Project Engineer  
R.G.E. 841



*Mark Burkholder*

Mark Burkholder  
Project Manager

NorCal Engineering

**TABLE I**  
**MAXIMUM DENSITY TESTS**  
**(ASTM: D1557-78)**

<u>Sample</u>	<u>Classification</u>	<u>Optimum Moisture</u>	<u>Maximum Dry Density (lbs./cu.ft.)</u>
I	Silty clay	14.0	110.0
II	Silty clay	13.0	112.0
III	Clayey silt	12.0	121.0
IV	SAND, fine to medium grained, silt with slight clay with gravel	10.0	128.0
V	Crushed Miscellaneous Base	7.5	138.0
VI	Silty clay	12.0	120.0
VII	Silty clay with gravel and brick	13.5	130.0
VIII	Clayey silt with gravel	12.5	125.0

**TABLE II**  
**COMPACTION TEST RESULTS**

<u>Date of Test</u>	<u>Test No.</u>	<u>*Depth</u>	<u>Percent Moisture</u>	<u>Unit Wt. lbs./cu.ft.</u>	<u>Relative Compaction</u>	<u>Soil Type</u>
5/21/97	101	8.0-8.5	18.5	102.9	93	I
5/21/97	102	8.0-8.5	13.9	108.8	98	I
5/21/97	103	6.0-6.5	13.4	118.2	97	III
5/21/97	104	6.0-6.5	10.2	114.3	94	III
5/21/97	105	6.0-6.5	14.0	120.2	99	III
5/22/97	106	5.0-5.5	9.8	119.3	98	III
5/22/97	107	5.0-5.5	13.0	116.1	95	III
5/22/97	108	5.0-5.5	13.3	114.7	95	III
5/22/97	109	5.0-5.5	13.6	112.7	93	III
5/22/97	110	4.0-4.5	14.4	116.3	96	III
5/22/97	111	4.0-4.5	16.3	116.9	96	III
5/22/97	112	4.0-4.5	15.4	116.1	95	III
5/22/97	113	4.0-4.5	11.3	118.0	97	III
5/22/97	114	3.0-3.5	13.2	115.9	95	III
5/23/97	115	3.0-3.5	12.2	118.5	97	III
5/23/97	116	3.0-3.5	12.8	118.8	97	III

\*Depth below finish grade (in feet)

\*\*Retest of failing tests after area reworked

**TABLE II**  
**COMPACTION TEST RESULTS**

<u>Date of Test</u>	<u>Test No.</u>	<u>*Depth</u>	<u>Percent Moisture</u>	<u>Unit Wt. lbs./cu.ft.</u>	<u>Relative Compaction</u>	<u>Soil Type</u>
5/23/97	117	3.0-3.5	13.4	120.8	99	III
5/23/97	118	3.0-3.5	13.1	115.8	95	III
5/27/97	119	2.0-2.5	13.4	118.2	97	III
5/27/97	120	2.0-2.5	13.1	114.9	94	III
5/28/97	121	3.0-3.5	13.8	118.6	98	III
5/28/97	122	2.0-2.5	12.1	111.5	92	III
5/29/97	123	4.0-4.5	13.7	117.9	97	III
5/30/97	124	3.0-3.5	12.6	119.4	98	III
5/30/97	125	1.0-1.5	13.2	113.1	93	III
5/30/97	126	1.0-1.5	12.9	116.9	96	III
5/30/97	127	1.0-1.5	13.0	115.0	95	III
5/30/97	128	1.0-1.5	13.0	115.9	96	III
5/30/97	129	3.0-3.5	14.0	114.9	94	III
6/25/97	130	3.0-3.5	15.5	115.0	95	III
6/25/97	131	3.0-3.5	14.2	115.5	95	III
6/25/97	132	3.0-3.5	11.0	113.5	93	III

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**COMPACTION TEST RESULTS**

<u>Date of Test</u>	<u>Test No.</u>	<u>*Depth</u>	<u>Percent Moisture</u>	<u>Unit Wt. lbs./cu.ft.</u>	<u>Relative Compaction</u>	<u>Soil Type</u>
6/27/97	133	3.0-3.5	10.2	114.3	94	III
6/27/97	134	1.0-1.5	13.5	121.3	95	IV
6/27/97	135	0.0-0.5	11.1	124.8	97	IV
6/27/97	136	1.0-1.5	12.3	117.8	92	IV
6/27/97	137	0.0-0.5	12.1	121.3	95	IV
6/30/97	138	0.0-0.5	11.0	112.6	93	III
6/30/97	139	1.0-1.5	14.0	113.1	93	III
6/30/97	140	1.0-1.5	11.4	115.2	95	III
6/30/97	141	0.0-0.5	12.1	111.5	92	III
6/30/97	142	0.0-0.5	10.2	109.8	90	III
7/31/97	143	Test not a part of current backfill operations				
8/1/97	144	Test not a part of current backfill operations				
8/1/97	145	Test not a part of current backfill operations				
9/17/97	146	10.0-10.5	14.1	113.1	94	VI
9/17/97	147	12.0-12.5	13.5	111.0	93	VI
9/17/97	148	7.5-8.0	12.2	111.4	93	VI

\*Depth below finish grade (in feet)

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**TABLE II**

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**TABLE II**  
**COMPACTION TEST RESULTS**

<u>Date of Test</u>	<u>Test No.</u>	<u>*Depth</u>	<u>Percent Moisture</u>	<u>Unit Wt. lbs./cu.ft.</u>	<u>Relative Compaction</u>	<u>Soil Type</u>
9/18/97	149	8.0-8.5	13.8	117.9	91	VII
9/18/97	150	11.0-11.5	12.7	115.3	92	VIII
9/18/97	151	10.0-10.5	13.8	116.9	90	VII
9/19/97	152	9.0-9.5	12.9	114.1	91	VIII
9/19/97	153	7.5-8.0	13.1	116.4	93	VIII
9/19/97	154	8.0-8.5	14.2	119.4	92	VII
9/22/97	155	6.0-6.5	11.1	116.7	90	VII
9/22/97	156	5.0-5.5	10.8	117.1	90	VII
9/22/97	157	5.5-6.0	8.6	118.8	91	VII
9/23/97	158	4.0-4.5	11.2	120.5	93	VII
9/23/97	159	3.0-3.5	8.9	120.3	93	VII
9/23/97	160	3.5-4.0	12.6	117.3	90	VII
9/23/97	161	4.5-5.0	12.8	115.2	92	VIII
9/24/97	162	3.0-3.0	9.6	118.6	91	VII
9/24/97	163	3.5-4.0	12.5	118.8	91	VII
9/24/97	164	2.5-3.0	12.9	116.5	93	VIII

\*Depth below finish grade (in feet)

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**COMPACTION TEST RESULTS**

<u>Date of Test</u>	<u>Test No.</u>	<u>*Depth</u>	<u>Percent Moisture</u>	<u>Unit Wt. lbs./cu.ft.</u>	<u>Relative Compaction</u>	<u>Soil Type</u>
9/24/97	165	2.0-2.5	12.3	115.3	92	VIII
9/24/97	166	1.5-2.0	11.8	116.5	93	VIII
9/25/97	167	2.0-2.5	10.5	123.1	95	VII
9/25/97	168	1.0-1.5	11.4	114.8	92	VIII
9/25/97	169	1.0-1.5	11.2	120.5	93	VII
9/29/97	170	1.5-2.0	13.8	120.4	93	VII
9/29/97	171	0.0-0.5	12.4	117.4	90	VII
9/29/97	172	0.0-0.5	10.7	117.5	90	VII
9/29/97	173	0.0-0.5	13.6	120.1	92	VII
11/5/97	174	12.0-12.5	14.6	106.5	95	II
11/5/97	175	10.0-10.5	13.2	117.4	94	VIII
11/5/97	176	9.0-9.5	12.9	119.6	92	VII
11/5/97	177	8.0-8.5	13.8	116.9	93	VIII
11/6/97	178	6.0-6.5	11.5	121.1	97	VIII
11/6/97	179	4.5-5.0	14.1	113.0	93	VIII
11/7/97	180	3.0-3.5	12.4	116.5	96	VIII
11/10/97	181	1.0-1.5	10.9	119.0	95	VIII

\*Depth below finish grade (in feet)

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(562)799-9469 FAX (562)799-9459

## CITY OF LOS ANGELES

### DEPARTMENT OF BUILDING AND SAFETY

#### ENGINEER'S CERTIFICATE OF COMPLIANCE FOR COMPACTED EARTH FILLS

JOB/LEGAL ADDRESS: Southwest Corner of 190th St. & Normamdie Ave.

SOIL TESTING AGENCY: NorCal Engineering

PROPERTY OWNER'S: NAME: Boeing Realty Company

OWNER'S ADDRESS: 4060 Lakewood Blvd., Lakewood

PER REPORTS ON OUR PROJECT NUMBER: 5936-96

DATE OF WORK STARTED ON PROJECT: 5/21/97

DATE FILL WAS COMPLETED: 11/10/97

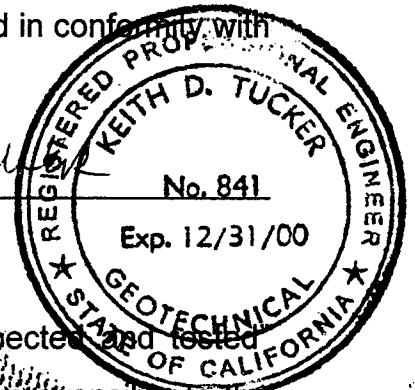
DATE OF THIS CERTIFICATE: 2/5/98

#### TO THE SUPERINTENDENT OF BUILDING:

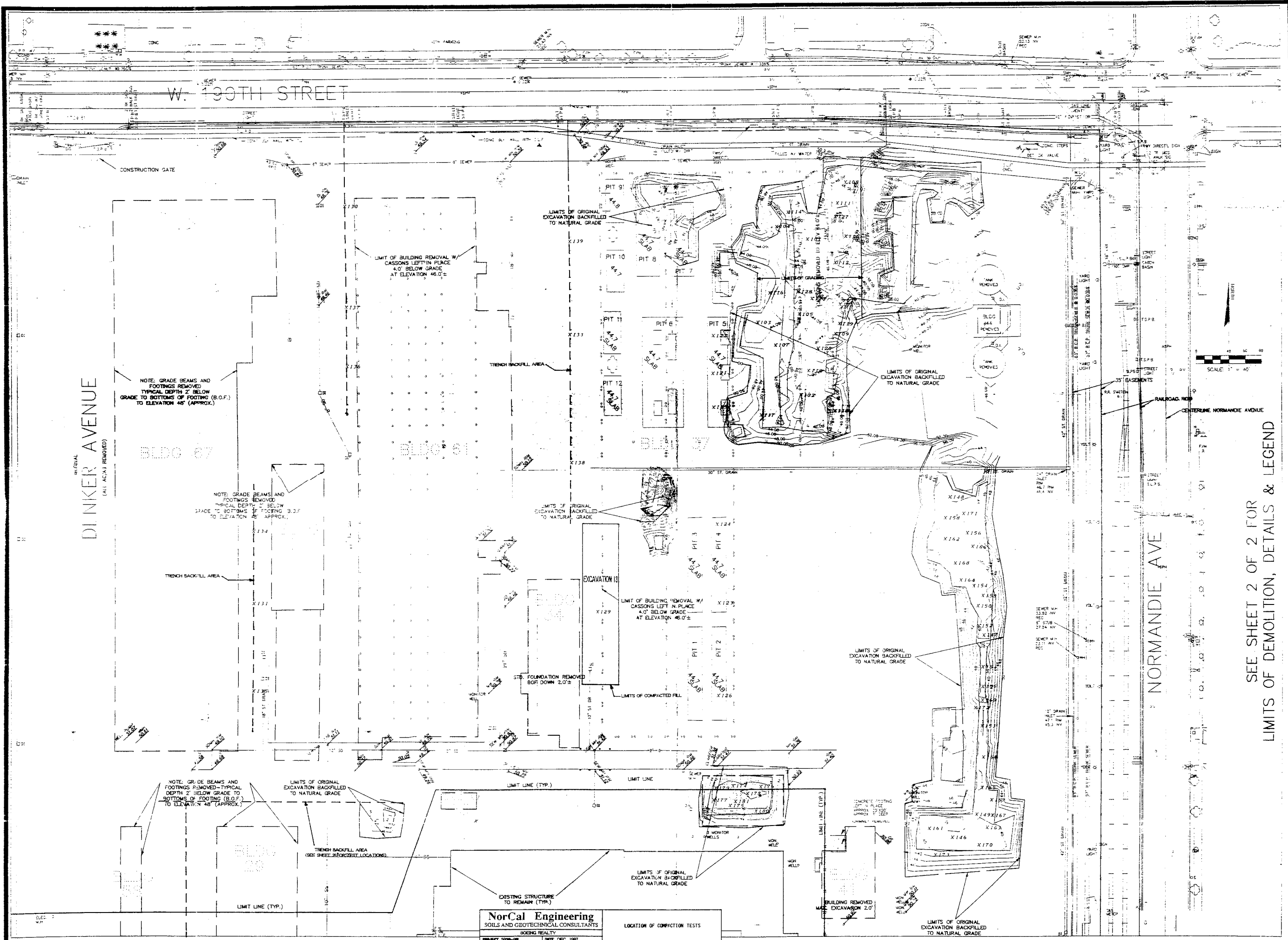
I hereby certify that I have personally inspected and tested the placing of compacted earth fill on the above described property, and on the basis of these inspections and tests it is my opinion that the same was placed in conformity with the requirements of the Los Angeles City Building Code.

*Keith D. Tucker*

Keith D. Tucker  
R.G.E. 841



\*For the purpose of this certificate, to have "personally inspected and tested" shall include inspection and testing performed by any person responsible to the licensed engineer signing this certificate. Where the inspection and testing of all or part of the work above is delegated, full responsibility shall be assumed by the licensed engineer whose signature is affixed thereon.



SEE SHEET 2 OF 2 FOR  
LIMITS OF DEMOLITION, DETAILS & LEGEND

**NorCal Engineering**  
SOILS AND GEOTECHNICAL CONSULTANTS  
10000 W. 190TH STREET  
LOS ANGELES, CA 90048  
PHONE (310) 550-8200  
FAX (310) 550-8201  
WWW.NORCAL-ENG.COM

LOCATION OF COMPACTION TESTS

PROJECT  
AS-BUILT DEMOLITION PLAN  
MOONELL DOUGLAS REALTY CO.  
4800 LANEWOOD BLVD., 5TH FLOOR  
HARBOR GATEWAY  
LOS ANGELES, CA 90048  
DATE: 10/21/97  
CHECKED: [Signature]  
DRAWN: [Signature]  
DATE: 10/21/97  
PROJECT NO: 970284

**TAT**  
TAT & ASSOCIATES INC.  
1100 TOWN & COUNTRY ROAD  
SUITE 1200  
BOSTON, MA 02118  
California 92688  
(714) 580-8200  
(714) 580-8201 FAX

1 OF 2